Treatment of clavicle fractures: systematic review

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This study assesses systemically the effectiveness and safety of non-operative and operative treatment of clavicle fractures. The evaluation is based on the literature published on clavicle fractures since 1965 to end of January 2007. The aim was to find out, if the results could be generalized to daily practise, and assess the reliability of evidence.

Introduction

Clavicle fracture is one of the most common fractures in adults. The incidence in Western countries has increased during last decades along with mobile and energetic way of life. At present the incidence of clavicle fractures is 50-64/100 000 and it is decreasing with age, especially within men (1,2). Clavicle fractures are more common among men (68%) than women (32%) and within men the most significant age group is young adults. Great majority of clavicle fractures are situated in the middle part (81%); whereas lateral (17%) and medial fractures (2%) are much more infrequent (3).

Conventionally clavicle fractures have been treated non-operatively arm immobilized in a sling for few weeks. There have been some recommendations for operative treatment, such as skin compromising in fracture area, open fracture, floating shoulder, neurovascular symptoms in upper extremity, or multiple injuries. Nowak et al. (2004) found out 7% non-union rate in non-operatively treated clavicle fractures after 6 months follow-up and great risk to prolonged sequels at 9- to 10-year follow-up (4). Hill et al. (1997) reported 15% non-union rate in non-operatively treated clavicle fractures and also evident connection between shortening and non-union (5). It is also defined predictable risk factors, which may cause complications in fracture healing and overall recovery. Fractures with displacement without bony contact, transversely placed fragments, and ageing are risk factors, which may cause sequels and therefore indicate for operative treatment (4).

Systematic review of 17 retrospective and 5 prospective reports with 2144 clavicle fractures shows some evidence for better results in operative treatment compared to non-operative treatment, and also a great risk for long-term sequels, if the fracture is displaced, comminuted, or fragmented (6).

In this study we aimed to assess systemically the effectiveness and safety of non-operative and operative treatment of clavicle fractures. The aim was also to find out, if the results could be generalized to daily practise and assess the reliability of evidence.

Methods

Study selection

To the analysis we included randomized controlled trials, controlled trials and prospective cohort studies in which were at least 30 adult patients (>18 y), and at least 6 months follow-up. We comprised studies dealing with middle or lateral third clavicle fractures. Intervention in the studies should be non-operative or operative treatment. Selected study had to inform at least one of following outcomes: union, non-union, function, pain, or complications. We excluded studies dealing with non-acute fractures (treatment after 3 weeks), and studies written in language the investigators were not able to read (Russian, Turkish, Chinese, Rumanian, and Bulgarian).
Information retrieval and assessment of trials

We made an electronic database search from literature without language restrictions from 1965 until end of January 2007. Study selection, data extraction, and assessment of methodological quality were made by two independent investigators. Discrepancy between investigators was solved by negotiation or when necessary, by third investigator.

Methodological quality of prospective cohort studies was evaluated according to defined assessment criteria. Our criteria were modified from Borghouts (7). Quality of randomized prospective studies was evaluated with van Tulder criteria (8).

Results

From the electronic database search was found 475 abstracts concerning clavicle fractures. Most of the studies excluded did not discuss the demanded subject, or did not fulfill inclusion criteria. For the final analysis we accepted 56 publications from which were found 45 retrospective studies. To the thorough analysis we qualified 11 studies, from which were 9 prospective studies and 2 randomized controlled trials. After all there were two authors, who published two articles from same material (4,9–11), so there were in total 9 studies in the thorough analysis. The trials were made in several countries: Canada, Germany, Netherlands, Scotland, Sweden, Taiwan, and United Kingdom.

The studies had 1595 patients with different types of clavicle fractures. There were two randomized controlled trials (287 patients) (12,13), and nine prospective cohort studies (1308 patients) (4,9–11,14–18). Most of the studies concerned middle clavicle fractures (454 patients) (9,10,12–14,16). Two studies concerned lateral clavicle fractures (65 patients) (15,17). Two were based on a wide number of patients, and included all clavicle fractures (1076 patients) (4,18).

Number of patients varied widely in the studies. In three studies low number of patients (31, 34, and 34 patients) was followed (14,15,17). Two studies followed moderate number of patients (53 and 80 patients) (10,16), and four studies considerable number of patients (132, 155, 208, and 868 patients) (4,12,13,18).

Loss of follow-up was acceptable in most of studies (0-15.9%) (4,12–17). In two studies loss of follow-up was not mentioned (9,10), and in one study loss of follow-up was rather high (23.7%) (18). Follow-up times were mostly competent in the included studies. In four studies the follow-up times were less than one year (10,13,16,18). In the remaining five studies the follow-up times were long enough; from 1 to 9–10 year (4,12,14,15,17). There were only three studies that compared two different interventions (12,13,16). Rest of the studies did not have control groups.

We evaluated the quality of prospective cohort studies according to Borghouts (7). We assessed the study as high quality, if it scored seven out of ten points. We evaluated three studies as high quality (4,16,17). Generally the studies had unhomogeneous populations. Study sizes were mostly too small and follow-up times short. Instead assessed studies had remarkable low drop-out percents, and outcome measures were reported properly.

Methodological quality of randomized controlled trials was assessed with van Tulder criteria (8). There were only two randomized controlled trials to evaluate (12,13). On average these trials were performed accurately. The studies had adequate method of randomization, and described sufficient concealment of allocation. In Canadian Orthopaedic Trauma Association research (2007) the drop-out percentage was rather high (15.9%), and it included the intention-to-treat analysis (12). Hoofwijk and van der Werken (1988) had remarkably low drop-out percentage (3.2%), but did not include the intention-to-treat analysis (13).

Treatment of middle third clavicle fractures

In seven studies concerning middle clavicle fractures were diverse primary outcome measures. In three studies the main outcome measure was pain expressed with VAS (Visual Analogue Scale) (10,13,16). In two studies the primary outcome measure was union (14,18), in one study function (Disabilities of Arm, Shoulder and Hand) (12), and in one study sequels (4).

In Canadian Orthopaedic Trauma Association study (2007) operative treatment gave significantly improved function compared to non-operative treatment in one year follow-up, and union-time was shorter in operative group (16.4 vs. 28.4 weeks) (12).

Jubel et al. (2005) stated operation with titanic elastic nail leads to better function, and less pain compared to rucksack bandage (16).

Hoofwijk and van der Werken (1988) found out no difference in union or function in fractures treated with rucksack bandage or mitella (13).

Nowak et al. (2004) noticed in ten year follow-up study, that 46% of conservatively treated clavicle frac-
Although clavicle fractures are common, there are only few randomized controlled trials of the subject. Most of the published studies are case reports or retrospective cohort studies, and thus were excluded from our analysis. Of all published studies concerning clavicle fractures we approved 11 articles to our final analysis. From that information is very challenging to make critical and definitive conclusions. It appears that operative treatment may lead to earlier union, and less sequels comparing non-operative treatment. Complications associated to operative treatment seem to be minor in accordance with published studies.

In practise we should notice type of fracture, quality and capacity of life, and the risks of selected treatment. With all clinical experience and the knowledge from literature we have to produce a synthesis of accurate treatment.

References


